



Eletrônica para Informática

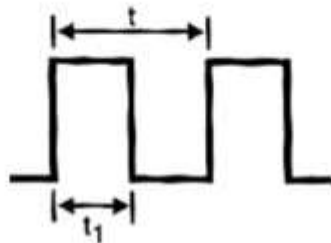
Duty-cycle



DUTY-CYCLE

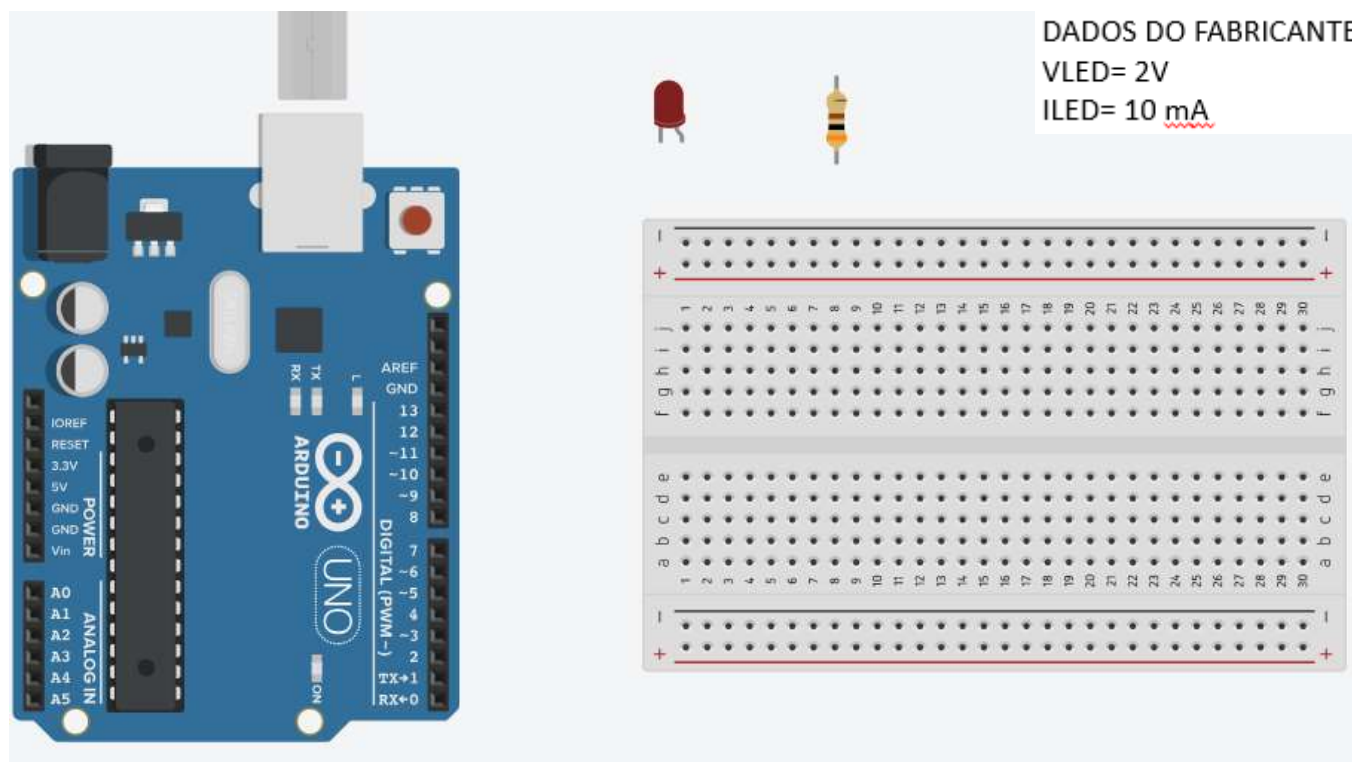
$$DutyCycle = \frac{t_{on}}{t_{on} + t_{off}} \cdot 100$$

➤ O tempo em on é representado por t1 e o período por t.



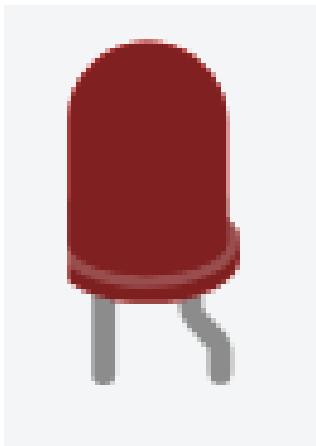


Exercício: Projete Hardware e firmware para fazer piscar um LED a uma frequência de 1Hz e Duty-cycle de 50%. Depois, altere o código para que apenas o duty-cycle seja modificado para 80%.





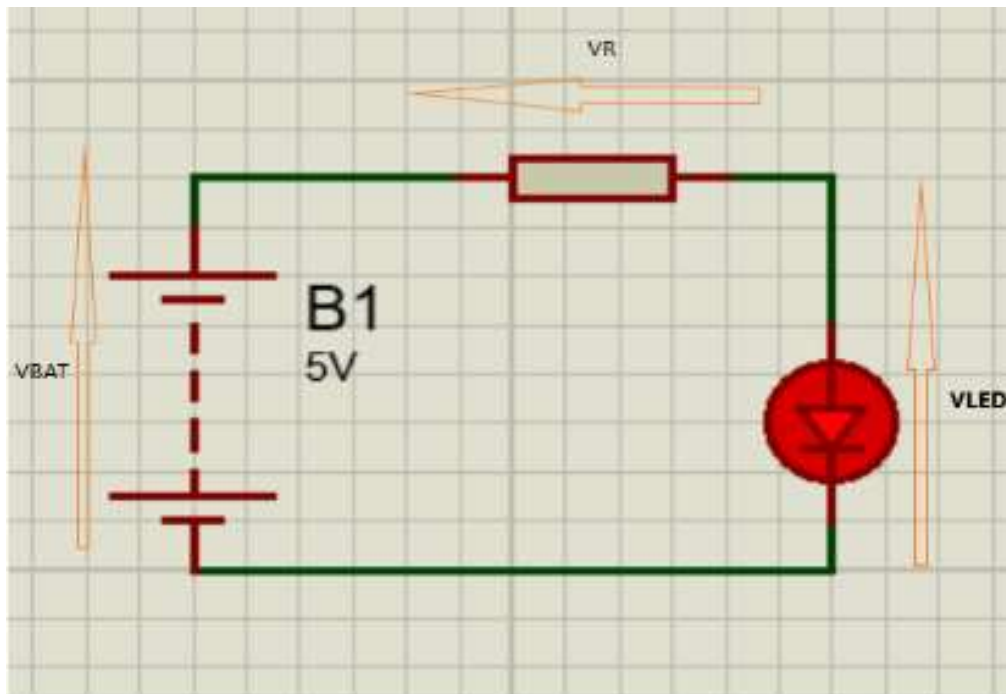
LED VERMELHO



DADOS DO FABRICANTE:

$V_{LED} = 2V$

$I_{LED} = 10\text{ mA}$



CÁLCULO DO VALOR DE “R”

$$V_{BAT} = V_{LED} + V_R$$

$$5V = 2V + V_R$$

$$V_R = 3V$$

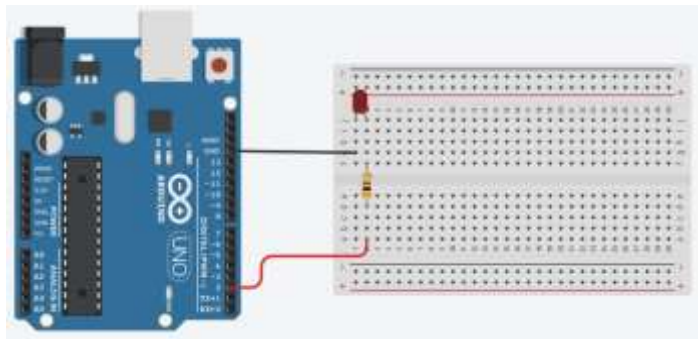
$$R = V_R / I_R$$

$$R = 3V / 10\text{mA}$$

$$R = 300\text{ ohms}$$



PARA $f=1$ HZ E Duty-cycle=50% :



$f= 1\text{Hz}$

$T= 1/f$, logo $T= 1/1\text{Hz}=1\text{s}$;

$T= t_{on} + t_{off}$

$$DutyCycle = \frac{t_{on}}{t_{on} + t_{off}} \cdot 100$$

$50= (t_{on}/T)*100$, logo $50=(t_{on}/1\text{s})*100$

$t_{on}=0,5\text{s}$

$t_{off}=0,5\text{s}$

CÓDIGO

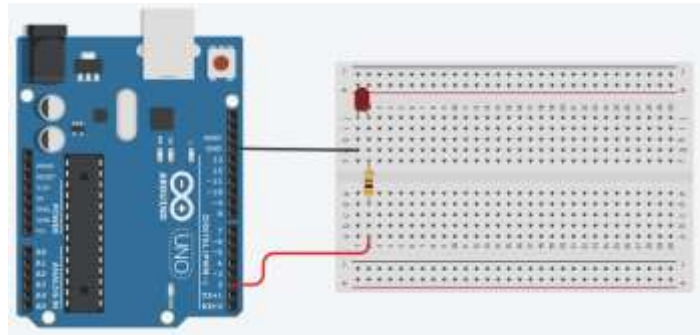
```
1 // C++ code
2
3 void setup()
4 {
5     pinMode(2, OUTPUT);
6 }
7
8 void loop()
9 {
10     digitalWrite(2, HIGH);
11     delay(500); // Wait for 500 millisecond(s)
12     digitalWrite(2, LOW);
13     delay(500); // Wait for 500 millisecond(s)
14 }
```



INSTITUTO FEDERAL

Ceará

PARA $f=1$ HZ E Duty-cycle=80% :



$f= 1\text{Hz}$

$T= 1/f$, logo $T= 1/1\text{Hz}=1\text{s}$;

$T= \text{ton} + \text{toff}$

$$\text{DutyCycle} = \frac{t_{on}}{t_{on} + t_{off}} \cdot 100$$

$80 = (\text{ton}/T) \cdot 100$, logo $80 = (\text{ton}/1\text{s}) \cdot 100$

$\text{ton}= 0,8\text{s}$

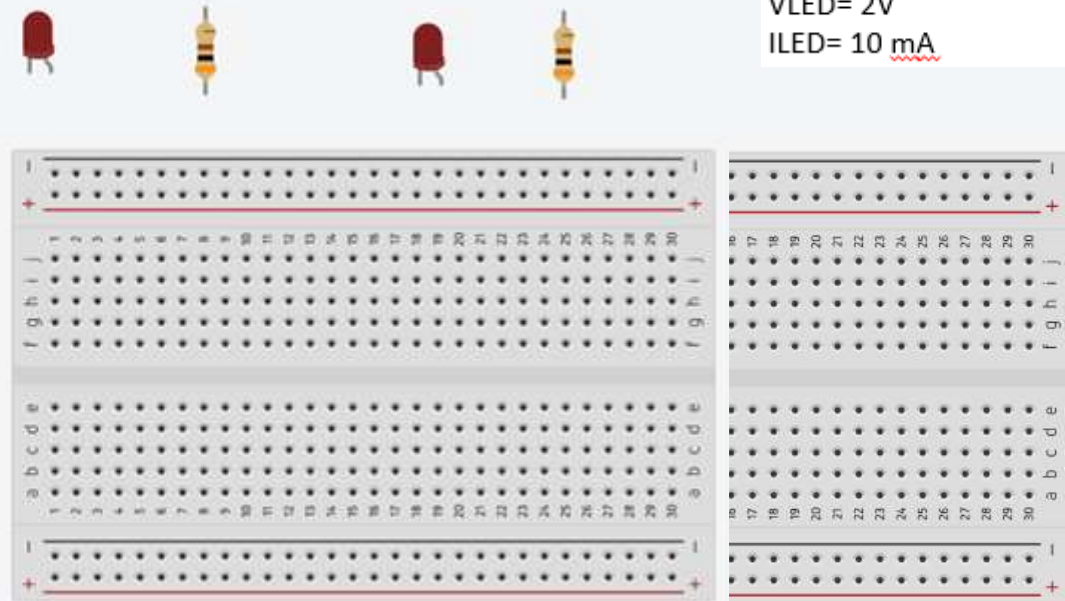
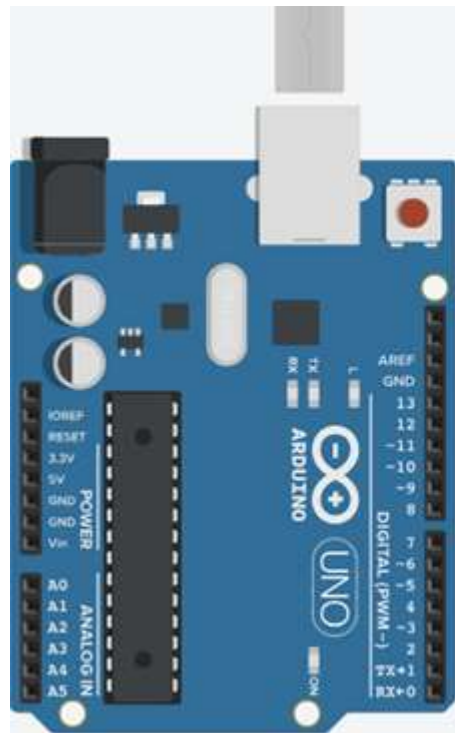
$\text{toff}= 0,2\text{s}$

CÓDIGO

```
1 // C++ code
2
3 void setup()
4 {
5     pinMode(2, OUTPUT);
6 }
7
8 void loop()
9 {
10     digitalWrite(2, HIGH);
11     delay(800); // Wait for 800 millisecond(s)
12     digitalWrite(2, LOW);
13     delay(200); // Wait for 200 millisecond(s)
14 }
```



Exercício: Projete Hardware e firmware para fazer piscar dois LED's de forma alternada, na frequência de 2Hz e Duty-cycle de um deles de 40% e do outro de 60%.



DADOS DO FABRICANTE:
 $V_{LED} = 2V$
 $I_{LED} = 10 \text{ mA}$